

CLAIMS:

1. A method for use in controlling processing of a structure, the method comprising:
 - providing first measured data indicative of at least one of the following: a thickness of at least one layer of the structure in at least selected sites of the structure prior to said processing of the structure, and a surface profile of the structure prior to said processing;
 - applying optical measurements to at least said selected sites in the structure after said processing and generating second measured data indicative of at least one of the following: a thickness of the processed structure and a surface profile of the processed structure;
 - analyzing the second measured data by interpreting it using the first measured data to thereby determine a thickness of at least one layer of the processed structure, said determined thickness being indicative of the quality of said processing.
2. The method of Claim 1, wherein said first measured data is provided by applying said measurements to the structure prior to said processing.
3. The method of Claim 1, wherein said first measured data is reference data obtained while controlling a previous processing of said structure.
4. The method of Claim 1, for use in controlling the process of material removal from the structure.
5. The method of Claim 4, wherein said first measured data is indicative of the thickness of an uppermost layer and the thickness of a layer underneath said uppermost layer of said structure, prior to applying the material removal process to said structure.
6. The method of Claim 5, wherein said process to be controlled is aimed at removing the uppermost layer and partially removing the underneath layer.
7. The method of Claim 5, wherein said thickness determined from the data analysis is the thickness of said underneath layer of the structure.

8. The method of Claim 5, wherein the data analysis provides for determining the thickness of said underneath layer and the thickness of said uppermost layer of the structure.

9. The method of Claim 5, wherein said first measured data is provided by
5 applying said measurements to the structure after the uppermost layer deposition process.

10. The method of Claim 1, for use in controlling the process of depositing an upper thin layer onto a lower thin layer of the structure, wherein the upper and lower layers materials are of the kind capable of diffusing one into the other within
10 an interface region between the layers.

11. The method of Claim 10, wherein said first measured data is indicative of the thickness of said lower layer, and said thickness determined from the data analysis is said the thickness of the upper layer.

12. The method of Claim 1, for use in controlling the process of depositing an
15 upper layer onto a patterned surface of a lower layer, the first measured data being indicative of the surface profile of the patterned lower layer., the data analysis providing for determining the thickness of the deposited layer.

13. A method for use in controlling processing of a structure, the method comprising:

20 - providing first optical spectral measured data indicative of at least one of the following: a thickness of at least one layer of the structure in at least selected sites of the structure prior to said processing of the structure, and a surface profile of the structure prior to said processing;

- applying spectral optical measurements to at least said selected sites in the
25 structure after said processing and generating second optical spectral measured data indicative of at least one of the following: a thickness of the processed structure and a surface profile of the processed structure;

- analyzing the second measured data by interpreting it using the first measured data to thereby determine a thickness of at least one layer of the

processed structure, said determined thickness being indicative of the quality of said processing.

14. A method for use in controlling a material removal process applied to a multi-layer structure, the method comprising:

5 - providing first optical spectral measured data indicative of a thickness of an uppermost layer of the structure and a thickness of a layer underneath said uppermost layer in at least selected sites of the structure prior to said processing of the structure;

10 - applying optical spectral measurements to at least said selected sites of the structure after said material removal processing of the structure, and generating second spectral measured data indicative of a thickness of the processed structure;

15 - analyzing the second measured data by interpreting it using the first measured data to thereby determine at least a thickness of said underneath layer in the processed structure, said determined thickness being indicative of the quality of said processing.

15. A method for use in controlling a layer deposition process applied to a structure, the method comprising:

20 - providing first optical spectral measured data indicative of a thickness of a first layer of said structure onto which a second layer is to be deposited;

20 - applying optical spectral measurements to at least selected sites in the structure after said layer deposition processing of the structure, and generating second measured data indicative of a thickness of the processed structure;

 - analyzing the second measured data by interpreting it using the first measured data to thereby determine a thickness of the deposited layer.

25 **16.** A method for use in controlling a layer deposition process applied to a patterned layer of a structure, the method comprising:

 - providing first optical spectral measured data indicative of a surface profile of said patterned layer of the structure onto which a second layer is to be deposited;

- applying optical spectral measurements to at least selected sites in the structure after said layer deposition processing of the structure, and generating second measured data indicative of a surface profile of the processed structure;

- analyzing the second measured data by interpreting it using the first
5 measured data to thereby determine a thickness of the deposited layer.

17. An optical system for use in controlling processing of a multi-layer structure, the system comprising:

- an optical device comprising a light source arrangement, a light detector assembly, and a light directing assembly, the optical device being operable to apply
10 optical measurements to the structure and generate data representative of light returned from the structure, said generated data being indicative of at least one of the following: a thickness of at least one layer of the structure, and a surface profile of the structure;

- a control unit connectable to the optical device to operate said device and
15 receive said generated data, said control unit having a memory utility for storing first measured data obtained from optical measurements applied to the structure prior to said processing, and having a processor utility preprogrammed to analyze second measured data obtained from the optical measurements applied to the structure after said processing, said analyzing of the second measured data
20 including interpreting the second measured data using the first measured data to thereby determine a thickness of at least one layer of the processed structure, said determined thickness being indicative of the quality of said processing.